REPORT NO. 140

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CATTLE FEEDING COSTS IN ARIZONA

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SUMMARY

1. Detailed records were obtained on 65 individual lots representing more than 18,400 head of cattle and calves fed during the 1955-56 feeding season.

2. Four of the common classes of cattle fed in Arizona were studied: (a) Hereford steers, (b) Hereford heifers, (c) Brahman-Cross steers, and (d) Brahman-Cross calves.

3. The average length of feeding period was 127 days for the Hereford steers; 116 days for the Hereford heifers; 116 days for Brahman-Cross steers; and 102 days for Brahman-Cross calves.

4. Average starting weights on feed were 743 pounds for the Hereford steers; 618 pounds for the Hereford heifers; 726 pounds for the Brahman-Cross steers; and 280 pounds for the Brahman-Cross calves.

5. The average gain per head per day was 2.36 pounds for the Hereford steers; 2.11 pounds for the Hereford heifers; 2.31 pounds for the Brahman-Cross steers; and 1.84 pounds for the Brahman-Cross calves.

6. The principal kinds of feed fed was barley and grain sorghum, cottonseed meal, molasses, cottonseed hulls, alfalfa and grain hay, and silage. Approximately 55 to 60 per cent of the rations were concentrate type feeds and 40 to 45 per cent were roughage type feeds.

7. The steers consumed on an average 27 pounds per head per day, heifers about 25 pounds, and the Brahman-Cross calves about 13.5 pounds per head per day.

8. For the steers and heifers it required an average of 1,191 pounds of feed to produce 100 pounds of gain as compared to 727 pounds for the calves.

9. The average cost per 100 pounds of gain during the 1955-56 feeding season was $25.25 for the Hereford steers; $25.11 for the Hereford heifers; $25.75 for the Brahman-Cross steers; and $15.81 for the Brahman-Cross calves.

10. Feed accounted for about 85 per cent of the cost of gains.

11. Other costs for labor, grinding, mixing and other overhead amounted to $5.25 per ton of feed fed.

12. Factors associated with low costs of gain were: (a) high feed conversion efficiency (pounds of feed per pound of gain), (b) high gaining ability, (c) the use of feeds of relatively lower cost in relation to feed value (such as silage), and (d) low death loss.

CATTLE FEEDING COSTS IN ARIZONA

by

Andrew Vanvig[1/]

This report summarizes the results of a study of costs incurred in cattle feeding in Arizona. The data presented covers the 1955-56 feeding season. Included are lots of cattle that were started on feed during the fall and winter months of 1955 and early 1956. All the lots were sold during the winter and spring of 1956. The last lot record was closed June 27, 1956. Detailed information on 65 individual lots representing more than 18,400 head of cattle and calves are included. An effort was made to select lots that would be representative of the cattle fattened in Arizona.

Eighteen cattle feeders located in the central part of the state cooperated in the study. Detailed lot records from ten of these were used in the analysis. These operators had scales at their feedlots and all feed fed a given lot of cattle was weighted and recorded. These scales were also used to obtain accurate weights of the cattle.

In general, the cooperators were operators of the larger feedlots since they were in a better position to provide complete and detailed records necessary for an accurate analysis of feeding efficiency. Several of these were custom feeders.

The purposes of this report are two-fold:

(1) To present detailed data which cattle feeders may use to compare their own operations with those summarized in this report.
(2) To provide information on cattle feeding costs for other interested groups, such as bankers, feed producers and dealers, ranchers, and students.

Class of Cattle Fed

The bulk of the cattle fattened in Arizona are "short-feds"; i.e., they are on feed for 200 days or less.[2/] Four of the more common classes of short-fed cattle are included in this study.[3/] These are: (1) Hereford steers, (2) Hereford heifers, (3) Brahman-Cross steers, and (4) Brahman-Cross calves.

1/ Associate Professor and Associate Agricultural Economist, University of Arizona, Tucson.

2/ An analysis of another feeding program -- long-fed calves -- will be presented in a later report. Under this system the calves are put on a "growing" ration consisting largely of hay and silage plus supplement until they weigh 600 to 700 pounds, at which time they are put on a finishing ration. This system may involve a 250 to 300 day feeding period.

3/ An examination of quarterly reports of cattle on feed in Arizona shows the following distribution: steers 56 per cent; heifers 19 per cent; calves 23 per cent; cows and other 2 per cent.

Length of Feeding Period

The average days on feed for the classes of cattle listed above was 127 days for the Hereford steers, 116 days for Hereford heifers, 116 days for Brahman-Cross steers, and 102 days for Brahman-Cross calves. While this is the average number of days on feed, cattle from a given lot may be sold over a period of a month or more. The common practice is to sort out and sell each load of cattle as they are ready (finished to the grade and weight desired). In some cases the "poor doers" or "tail enders" may be on feed for as much as a month to six weeks longer than the better animals.

Weights of Animals

Purchase and sale weights were used as a basis for determining weight gains. Feeder cattle purchased off the range are normally kept off feed and water overnight and weighed in the morning with a three per cent shrink. Variations from this are made depending on how far the animals have been driven, time of year, amount of sorting taking place before weighing, etc. In a few cases where purchase weight was not available, the unload weights were adjusted to correspond as closely as possible to purchase weights. 1/

Most of the cattle fattened in Arizona are sold F.O.B. the feedlot. The usual practice is to weigh the cattle after a one hour stand and deduct a four per cent shrink. Weighing is normally done early in the morning -- since the cattle are less likely to have a fill at that time.

Gains are the difference between the selling weights and the purchase weights. The rate of gain is found by dividing the gain per head by the average number of days on feed.

The table below shows the average in-weights; average out-weights; and the average gain for the classes studied.

	No. of lots	Average weight		Average gain
		in	out	
Hereford steers	22	743	1,042	299
Hereford heifers	20	618	862	244
Brahman-Cross steers	10	726	994	268
Brahman-Cross calves	13	280	468	188

1/ Sometimes the animals are raised by the feeder or are purchased as calves and put on irrigated pasture for a time before going into the feedlot.

Feed Consumption

Rations Used

The basic feeds used in rations fed fattening cattle in Arizona are grain, cottonseed meal, molasses, hulls, hay and straw, and sometimes silage. The grains include barley and grain sorghum; either separately or in combination. On an over-all basis more barley is fed than grain sorghum. These grains are either ground or rolled with some increase in the trend toward rolling. Cottonseed meal is the predominant protein supplement with stilbestrol added in some cases. All the lots studied received molasses, and all but five out of 65 received some cottonseed hulls. Included in the hay category are alfalfa hay, barley hay, and in some cases straw. (A common ratio is one bale each of alfalfa hay, barley hay, and straw.) Twenty-five out of the sixty-five lots studied received silage as part of the ration. There appears to be an increase in silage feeding, predominantly hegari. In only three lots were the cattle fed green feed.

In the typical short-fed feeding program three rations are used. The first is a high roughage ration. This ration is used to get the animals started on feed and may be used for the first 20 to 30 days. The percentage of concentrate then is stepped up to about 50 to 55 per cent and the animals are kept on this ration for an additional 30 days. The animals are then put on the "hottest" ration which may contain from 60 to 70 per cent concentrate. They are finished on this ration -- requiring 60 to 70 days. If the cattle have been on irrigated pasture or are quite "fleshy" when they are started on feed, only two rations are normally used during the fattening period.

The following table shows the typical make-up of three rations used in Arizona.

Kind of feed	Ration #3 (first 20 to 30 days)	Ration #2 (next 30 days)	Ration #1 (last 60 to 70 days)
Grain	28	36	50
Meal	8	8	8
Molasses	10	10	10
Hulls	21	17	13
Hay	33	29	19
Total	100%	100%	100%

One feeder uses a standard dry ration and adds considerable silage at the beginning of the feeding period. As the cattle are fattening, he reduces the amount of silage and increases the amount of dry ration bringing about the shift from roughage to concentrate in that way. The makeup of the dry ration, however, remains the same.

Accurate records were kept on the number of pounds and the number of days that each ration was fed. Most of the cooperating feeders had either the "batch" type or "percentage" mill. This made it possible to determine accurately the number of pounds of each feed ingredient that a given lot of cattle received during the feeding period.

The average proportion by weight of concentrate and roughage in the ration for the entire feeding period was as follows:

Class	Concentrate	Roughage
	per cent	per cent
Hereford steers	55	45
Hereford heifers	51	49
Brahman-Cross steers	59	41
Brahman-Cross calves	61	39

Feed Additives

Stilbestrol and the antibiotics are not widely used by Arizona cattle feeders at the present time. Many of the feeders have used hormones on a trial basis, but the results have not been clear-cut in favor of their use on all cattle. In a few cases adverse side effects have resulted (from improper dosages) and in other cases the cost of gains has been as high with stilbestrol as without. Usually there has been some improvement in rate of gain. However, unless the cost per pound of gain is less than where they are not used, there is little advantage in their use. Both the implantation method and the method where the additive is mixed with the feed have been used. Fourteen of the lots included in this study received stilbestrol.

Efficiency in Use of Feed

For each lot of cattle the number of pounds of feed required to produce 100 pounds of gain was calculated. For the Hereford steers and heifers and the Brahman-Cross steers it took an average of 1,191 pounds of feed to put on 100 pounds of gain. For the Brahman-Cross calves it took 727 pounds of feed per 100 pounds of gain. Thus, in terms of feed conversion efficiency Brahman-Cross calves require only about 61 per cent as much feed per pound of gain as do the older cattle.

Class	No. of lots	Average weight during feeding period	Pounds of feed required per 100 pounds of gain
Steers and heifers [a]	52	828	1,191 [b]
Brahman-Cross calves	13	374	727 [c]

a / Includes both Herefords and Brahman-Crosses

b / Averages 37.2 per cent grain, 8.3 per cent meal, 8.9 per cent molasses, 26.2 per cent hay, 10.2 per cent hulls, 8.6 per cent ensilage, 0.6 per cent green feed.

c / Averages 43.4 per cent grain, 7.4 per cent meal, 10.2 per cent molasses, 23.7 per cent hay, 14.2 per cent hulls, 1.1 per cent ensilage.

Daily feed consumption per head per day varied quite widely. The range was from 20.74 to 34.48 pounds per head per day for the steers and heifers and from 11.94 to 15.47 pounds for the calves.

The average daily feed consumption for steers and heifers and for calves expressed as a per cent of average body weight is shown in the following table.

Class	No. of lots	Average weight during feeding period	Average daily feed consumption	Average daily feed consumption as per cent of average body weight
Steers and heifers [a]	52	828	26.61	3.22
Brahman-Cross calves	13	374	13.34	3.57

a / Includes both Herefords and Brahman-Crosses.

Feed Prices

The following feed prices were used in determining feed costs for the 1955-56 feeding season. The same prices were used for all lots studied to put them on a comparable basis. They are the average prices at the feedlot.

Kind of feed	Dollars per ton
Grain	45.00
Cottonseed meal	60.00 a/
Molasses	32.00
Hulls	20.00
Hay	25.00 b/
Silage	8.50
Green feed	6.75

a/ Where the protein supplement purchased contained stilbestrol, a price of $82 per ton was used.

b/ The price of $25 represents an average for the quality and kind of hay fed. Cattle feeders normally do not feed top quality alfalfa hay, and in many instances barley hay and sometimes straw are included.

Other Costs

In addition to the cost of feed, other costs are incurred in fattening cattle. These include labor and overhead costs associated with the operation of the feed mill, corrals, troughs, water system, feed trucks, etc. These costs were figured on the basis of per ton of feed fed. Total overhead costs, including labor was calculated to average $5.25 per ton. This was broken down as follows: labor $2.10 per ton feed fed (40%) 1/; power and maintenance $1.85 per ton (35%); and depreciation $1.30 per ton (25%).

Three-fourths (or $3.95 per ton) represents cash costs while the balance ($1.30) for depreciation is a non-cash cost. This means that the owner of a feeding establishment in considering whether or not to feed cattle in a given year, needs to consider only the feed plus other cash costs since depreciation cost would go on at about the same level whether cattle were fed or not.

1/ Including supervisory and office help when required. Labor costs are sometimes figured on a per head per day basis. At $2.10 per ton of feed fed, this would amount to from 1-3/4c to 3c per head per day, depending on the size of the animal.

Veterinary fees, medicine, sprays, brand inspection, Beef Council, and other dues were figured at an average of 50 cents per head. Personal property taxes were figured at $1.50 per head for steers and heifers and $.75 per head for calves.[1] These charges were then divided by the number of pounds of gain to put them on a cost per pound of gain basis.

In this analysis it was assumed that the value of the manure produced would about equal interest charges. The value of the manure would amount to about $1.25 per ton of feed fed or for an animal requiring about 3,550 pounds of feed to put on 300 pounds of gain -- this credit would amount to $2.20 per head. This approximately offsets the interest charge on a production loan covering two-thirds the cost of the feeder at six per cent for five months. Interest charges, of course, will vary depending on how much the operator has to borrow.

COST OF GAINS

The most important factor affecting the cost of gains is feed conversion efficiency; i.e., the number of pounds of feed required per 100 pounds of gain. This is true because feed accounts for about 85 per cent of the cost of fattening cattle.

For the Hereford steers the lowest cost lots required only 1,063 pounds of feed per 100 pounds of gain as compared to 1,323 pounds for the highest cost lots or about 260 pounds less feed per 100 pounds of gain (Table 1).[2] Total cost per 100 pounds of gain averaged $22.33 for the low cost lots; $28.09 for the high cost lots; and $25.22 for all 22 lots. There was very little difference in average daily feed consumption between the low cost and high cost groups.

There is apparently no difference in feed efficiency between sexes and breeds of cattle of comparable weights. The 22 lots of Hereford steers averaged 1,184 pounds of feed per 100 pounds of gain (Table 1); the 20 lots of Hereford heifers averaged 1,188 pounds (Table 2) and the ten lots of Brahman-Cross steers 1,210 pounds (Table 3). There is, however, considerable variation in feed efficiency of animals within a class. For example, in the Hereford steer class the range was from a low of 950 pounds of feed per 100 pounds of gain to a high of 1,540 pounds per 100 pounds of gain.

Calves are much more efficient in the use of feed than are the larger animals. The 13 lots of short-fed Brahman-Cross calves required an average of 727 pounds of feed per 100 pounds of gain (Table 4). This is nearly 460 pounds less than that required for the larger animals. Because of this higher feed conversion efficiency, the cost per 100 pounds of gain for the calves averaged only $15.80 compared to about $25.50 for the steers and heifers.

1/ Feeder calves under six months are usually taken on a two for one basis. This is based on an assessed valuation of $35.00 per head for the number on feed at the time of the assessment and using average tax rates. The calculated tax of $2.00 to $3.00 per head was then reduced to $1.50 since cattle put on feed and finished out during the last half of the year escape assessment and the $1.50 would represent an average property tax paid per head for short-fed cattle.

2/ Records of individual lots are available upon request.

A second factor associated with the cost of gains is rate of gain per day. The low cost lots of Hereford steers gained nearly one-half pound per head per day more than the high cost lots. The difference was less in the Brahman class but here, too, the low cost lots gained faster than the high cost lots.

The use of silage seems to contribute to lower cost gains. For the Hereford steers the low cost lots received an average of 13.5 pounds of silage per head per day, while the high cost lots received less than four pounds. Five out of the seven in the low cost group received silage as part of the ration as compared to two out of seven in the high cost group. These costs were based on a hay price of $25.00 per ton and a silage price of $8.50.

The use of stilbestrol showed no conclusive evidence of lowering cost of gain in the lots observed. Eight of the 22 lots of Hereford steers received stilbestrol. Two of these lots were in the lowest cost one-third of the lots; four of the lots were found in the middle cost one-third; and the other two were found in the highest cost one-third of the lots. The same was true for Hereford heifers. Six of the 20 lots received stilbestrol. Two of them were found in the lowest cost one-third group; three in the middle group; and one in the highest group.

There is no advantage in feeding more cottonseed meal than is required to balance the ration. In fact, it may simply increase the cost of gain. In this study the low cost lots of Hereford steers received an average of 2.26 pounds per head per day as compared to 2.73 pounds for the high cost lots.

Death loss also affects the cost of gains. The average death loss for all lots of Hereford steers was less than five-tenths of one per cent. Death loss averaged .40 per cent for the Hereford heifers; .27 per cent for the Brahman-Cross steers; and .61 per cent for the Brahman-Cross calves.

The average cost per head per day was 60 cents for the Hereford steers; 59 cents for the Brahman-Cross steers; 53 cents for the Hereford heifers; and 29 cents for the Brahman-Cross calves. This is closely related to the daily feed consumption which was about 28 pounds for the Hereford and Brahman-Cross steers; 25 pounds for the Hereford heifers; and about 13.5 pounds of feed per head per day for the Brahman-Cross calves.

Table 1. Records for 22 lots of Short-fed Hereford Steers (3,792 head) 1955-1956.

	Average for all lots	Average for 1/3 of lots (lowest cost)	Average for 1/3 of lots (highest cost)
Number of head per lot	172	152	224
Per cent death loss	.45	0	.89
Average days on feed	127	129	131
Average weight in	743	690	782
Average weight out	1,042	1,026	1,069
Average gain	299	336	287
FEED FED PER HEAD PER DAY			
Grain	10.56	10.00	11.20
Meal	2.34	2.26	2.73
Molasses	2.31	1.78	2.67
Hay	7.08	7.15	7.17
Hulls	2.59 2/	2.18	3.82
Ensilage	7.56 2/	13.53 3/	3.97 4/
Green feed	1.03 2/	00	00
Total pounds 1/	27.66	27.88	28.92
	(33.47)	(36.90)	(31.57)
Daily feed consumption as per cent of average weight	3.10	3.24	3.12
FEED FED PER 100 LBS. GAIN			
Grain	450.0	377.5	511.3
Meal	100.5	87.0	124.2
Molasses	100.1	69.0	121.6
Hay	303.1	268.6	330.2
Hulls	111.2 2/	80.5	171.3
Ensilage	319.9 2/	542.6 3/	192.1 4/
Green feed	48.6 2/	00	00
Total pounds 1/	1,184.0	1,063.5	1,322.6
	(1,433.4)	(1,425.2)	(1,450.7)
Per cent concentrate in the ration	55.3	51.5	57.3
COST PER 100 LBS. GAIN			
Feed	$ 21.47	$ 18.92	$ 23.89
Other	3.78	3.41	4.20
Total	$ 25.25	$ 22.33	$ 28.09
COST PER HEAD PER DAY	$ .60	$ .59	$ .61
GAIN PER HEAD PER DAY (lbs.)	2.36	2.63	2.19

1/ In the totals the actual weight of ensilage is converted to hay equivalent basis by dividing by three; green feed, by dividing by four.

2/ Twelve lots received ensilage; the average being 13.85 pounds per head per day or 586.5 pounds per 100 pounds of gain; two lots received green feed, the average being 11.38 pounds per head per day or 534.8 pounds per 100 pounds of gain. Nineteen lots received hulls, average being 3.18 pounds per head per day or 128.8 pounds per 100 pounds of gain.

3/ Five lots received ensilage, the average being 18.95 pounds per head per day or 759 pounds per 100 pounds of gain.

4/ Two lots received ensilage, the average being 13.91 pounds per head per day or 672 pounds per 100 pounds of gain.

Table 2. Records for 20 lots of Short-fed Hereford Heifers (4,225 head) 1955-1956.

	Average for all lots	Average for 1/3 of lots (lowest cost)	Average for 1/3 of lots (highest cost)
Number of head per lot	211	120	356
Per cent death loss	.40	1.07	.20
Average days on feed	116	115	116
Average weight in	618	610	645
Average weight out	862	868	875
Average gain	244	258	230
FEED FED PER HEAD PER DAY			
Grain	8.56	8.71	9.55
Meal	2.08	2.15	2.13
Molasses	2.11	2.13	2.24
Hay	6.82	6.04	7.04
Hulls	2.07 2/	2.75	2.02
Ensilage	9.39 2/	8.11 3/	4.74 4/
Green feed	.39 2/	00	1.12 4/
Total pounds 1/	24.86	24.49	24.84
	(31.42)	(29.89)	(28.84)
Daily feed consumption as per cent of average weight	3.35	3.32	3.27
FEED FED PER 100 LBS. GAIN			
Grain	408.1	386.7	479.1
Meal	99.6	95.9	108.2
Molasses	101.1	97.0	113.4
Hay	328.8	267.3	355.6
Hulls	98.3 2/	122.5	102.2
Ensilage	440.4 2/	358.4 3/	246.0 4/
Green feed	20.2 2/	00	57.6 4/
Total pounds 1/	1,187.8	1,088.9	1,254.9
	(1,496.5)	(1,327.8)	(1,462.1)
Per cent concentrate in the ration	51.5	53.1	56.4
COST PER 100 LBS. GAIN			
Feed	$ 21.17	$ 19.49	$ 22.87
Other	3.94	3.67	4.21
Total	$ 25.11	$ 23.16	$ 27.08
COST PER HEAD PER DAY	$ .53	$ .52	$ .54
GAIN PER HEAD PER DAY (lbs.)	2.11	2.25	1.98

1/ In totals, the actual weight of ensilage is converted to hay equivalent basis by dividing by three; green feed, dividing by four.

2/ Eighteen lots received hulls, average 2.30 pounds per head per day or 109.3 pounds per 100 pounds of gain; eleven lots received ensilage, average 17.08 pounds per head per day or 800 pounds per 100 pounds of gain; one lot received green feed, 7.87 pounds per head per day or 403.5 pounds per 100 pounds of gain.

3/ Three lots received ensilage, averaged 18.93 pounds per head per day or 833 pounds per 100 pounds of gain.

4/ Three lots received ensilage, averaging eleven pounds per head per day or 640 pounds per 100 pounds of gain. One lot received green feed, 7.87 pounds per head per day or 403 pounds per 100 pounds of gain.

Table 3. Records for 10 lots of Short-fed Brahman-Cross Steers (2,639 head) 1955-1956.

	Average for all lots	Average for 1/3 of lots (lowest cost)	Average for 1/3 of lots (highest cost)
Number of head per lot	264	368	240
Per cent death loss	.27	0	.83
Average days on feed	116	126	124
Average weight in	726	652	765
Average weight out	994	949	1,035
Average gain	268	297	270
FEED FED PER HEAD PER DAY			
Grain	11.43	11.07	11.81
Meal	2.13	1.65	2.33
Molasses	2.92	2.66	2.96
Hay	6.79	6.48	6.90
Hulls	4.53	4.69	4.54
Total pounds	27.80	26.55	28.54
Daily feed consumption as per cent of average weight	3.25	3.32	3.17
FEED FED PER 100 LBS. GAIN			
Grain	495.8	471.8	542.5
Meal	93.3	70.3	108.9
Molasses	127.3	113.3	135.4
Hay	297.7	276.7	319.6
Hulls	196.5	198.5	205.8
Total pounds	1,210.6	1,130.6	1,312.2
Per cent concentrate in the ration	59.2	58.0	60.1
COST PER 100 LBS. GAIN			
Feed	$ 21.81	$ 20.32	$ 23.80
Other	3.94	3.66	4.23
Total	$ 25.75	$ 23.98	$ 28.03
COST PER HEAD PER DAY	$ .59	$ .56	$ .61
GAIN PER HEAD PER DAY (lbs.)	2.31	2.35	2.19

Table 4, Records for 13 lots of Short-fed Brahman-Cross Calves (7,826 head) 1955-1956,

	Average for all lots	Average for 1/3 of lots (lowest cost)	Average for 1/3 of lots (highest cost)
Number of head per lot	602	411	844
Per cent death loss	,61	,55	,24
Average days on feed	102	108	93
Average weight in	280	257	302
Average weight out	468	468	472
Average gain	188	211	170
FEED FED PER HEAD PER DAY			
Grain	5,84	5,76	6,30
Meal	,98	,86	1,02
Molasses	1,37	1,30	1,50
Hay	3,17	2,95	3,97
Hulls	1,94 2/	2,14	1,69
Ensilage	,13 2/	00	00
Total pounds 1/	13,34 (13,43)	13,01	14,48
Daily feed consumption as per cent of average weight	3,57	3,59	3,74
FEED FED PER 100 LBS, GAIN			
Grain	317,5	294,5	347,0
Meal	54,0	44,6	56,4
Molasses	74,9	66,5	82,4
Hay	173,3	152,3	218,4
Hulls	104,1 2/	107,9	93,4
Ensilage	8,1 2/	00	00
Total pounds 1/	726,6 (731,9)	665,8	797,6
Per cent concentrate in the ration	61,5	60,9	60,9
COST PER 100 LBS, GAIN			
Feed	$ 13,23	$ 12,08	$ 14,48
Other	2,58	2,34	2,84
Total	$ 15,81	$ 14,42	$ 17,32
COST PER HEAD PER DAY	$,29	$,28	$,32
GAIN PER HEAD PER DAY (lbs,)	1,84	1,95	1,82

1/ In the totals, the actual weight of ensilage is converted to hay equivalent by dividing by three,

2/ Only one lot received ensilage, average 1,91 pounds per head per day or 105,8 pounds per 100 pounds of gain, Twelve lots received hulls averaging 2,1 pounds per head per day or 112,5 pounds per 100 pounds of gain,